

METHOD AND APPARATUS FOR MEASURING THE RESISTIVITY OF  
ELECTROMAGNETIC WAVES OF THE EARTH

ABSTRACT OF THE DISCLOSURE

Disclosed is a method and apparatus for measuring the electromagnetic wave resistivity of earth formations. The disclosed method and apparatus use an electric field sensor, a magnetic field sensor in conjunction with a data collecting system to obtain data samples from strata, determine certain parameters associated with the data samples, such as a depth coefficient and a surface-layer depth coefficient, establish an observational reference frame based upon an equation defined by the stratum depth (H) and propagation frequency (F) and an equation defined by the electromagnetic wave resistivity ( $\rho$ ) and stratum depth (H), and utilize the reference frame to record results from a data collecting, controlling, storing and processing system configured for continuously measuring the electromagnetic wave resistivity of earth formations. Compared with the conventional method where the multi-variable theory and formula is used for determining the stratum depth and/or thickness, the presently disclosed method uses actual data to determine the relationship between the stratum depth (H) and propagation frequency (F), which makes the resistivity of earth formations the only variable to be measured and thus significantly improves the accuracy of depth measurements. In addition, the disclosed apparatus provides almost real-time data processing of the collected data samples to produce a changing curve of the measured electromagnetic wave resistivity corresponding to any changes in the stratum depth. The disclosed method and apparatus can be directly applied in the field of mineral exploration, and it will reduce the number of well drills and improve the efficiency of mineral exploration.